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Application of Multi-Level Fuzzy Comprehensive Evaluation in the Pension Industry of Combination of Medical and Nursing in Heilongjiang Province

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Abstract | **Review Article**

The development of pension service industry is the internal requirement of building a harmonious society and promoting the coordinated development of economy and society. Construction of evaluation index system of combination of medical and nursing. There are 6 primary indicators and 21 secondary indicators. By means of questionnaire, this paper investigates the satisfaction of the current medical and nursing industry in Heilongjiang Province, and establishes a fuzzy judgment matrix. The entropy method is used to determine the weight of each index, and the multi-level fuzzy evaluation model of the combination of medical care and pension industry in Heilongjiang Province is established. The comprehensive score was 78.65. It shows that the industry of the combination of medical care and pension in Heilongjiang Province is at the middle and upper level. Although people are very satisfied with the current pension industry, there is still room for improvement. Finally, according to the analysis of the results of the above model, some suggestions are put forward to effectively promote the development of the industry.

Keywords: Combination of medicine and nutrition, Pension industry, Entropy method, Multi-level fuzzy comprehensive evaluation

INTRODUCTION

The pension industry under the mode of combination of medical care and pension has a great contribution to the economic development of our province, and it is an important measure to reduce the problem of population aging in our province. Therefore, this measure plays an important role in population aging and economic development [1]. In the face of the severe situation of aging population in our province, we should speed up the solution of the pension industry and other related problems under the mode of combination of medical care and pension. By the end of 2018, the elderly population of our province was 7.484 million, accounting for 19.8%, 1.9 percentage points higher than that of the country. All departments in the Provincial Committee of population aging must accelerate the promotion of health care services for the elderly. And constantly optimize the allocation of health care resources for the elderly [2]. The division of responsibilities between families must be strengthened. Under the health care service combination mode, the elderly community and pension institutions should be established. And through the combination of families, we can establish a reliable pension system for the elderly.

1. The Current Situation of the Development of the Pension Industry in Heilongjiang Province

Since the reform and opening up, Heilongjiang Province as an important development base in China.The number and proportion of its population have changed dramatically. With the continuous development of science and technology, the problem of population aging in Heilongjiang Province has become increasingly prominent.

It can be seen population datas that the development trend is the same as that of China in recent years, both of which are increasing year by year. However, the population aging rate of Heilongjiang Province is higher than the average aging rate of China. It shows that the problem of population aging in Heilongjiang province needs to be solved. The

establishment of a perfect combination of medical care and pension industry should be needed.

In view of the current serious trend of aging. Heilongjiang provincial government actively develops three modes of home-based care, organization based care and community-based care. It not only issued various pension policies, but also increased the investment in health care and other aspects. To a certain extent, it alleviates the social pressure of providing for the aged. There are 20377 health institutions in Heilongjiang Province, 257539 beds and 305552 in total. According to the data in this table, Harbin is the first tier city in Heilongjiang Province. Its medical and health development is in the leading position in Heilongjiang Province. However, there is a serious lack of health institutions in underdeveloped areas such as Daxinganling. The number of health institutions is only 309, far less than the 4240 in Harbin. It shows that there are serious regional restrictions in the pension industry of Heilongjiang Province, and the government needs to speed up the introduction of relevant management measures.

2. Establishment of Multi-Level Fuzzy Evaluation Model for the Pension Industry of the Combination of Medical Care and Pension in Heilongjiang Province

The fuzzy evaluation model is mainly based on the membership theory of fuzzy mathematics, to determine the factor set of fuzzy evaluation, and then to determine the weight vector of the index, to get the total evaluation vector, and finally to make fuzzy evaluation by using the total evaluation vector and weighted average. The multi-level fuzzy comprehensive evaluation is mainly to classify the evaluation indexes of the combination of medical care and pension industry, make a comprehensive evaluation on each kind of factors (first level index), and make a higher level evaluation on each kind of factors (second level index). The first mock exam is to select the index, standardize the data and determine the weight vector of the index. After obtaining the total evaluation index, the fuzzy evaluation value is finally made by using the total evaluation vector and weighted average, and the fuzzy comprehensive evaluation score is quantified, and the merits and faults of the industrial development are judged according to the numerical value. This paper will be divided into five levels, namely {very satisfied, satisfied, general, less satisfied, dissatisfied}.

2.1 Establishment of Multi-Level Fuzzy Evaluation Index

According to the references [3-5] about the comprehensive evaluation of the industry of the combination of medical care and pension, 21 evaluation indexes about the industry of the combination of medical care and pension are selected. According to the data collected in Heilongjiang statistical yearbook, the multi-level fuzzy evaluation model is established. This paper discusses the development prospects of the industry from the following six aspects: population status, insurance services, health security, economic and consumption index, social welfare and Engel coefficient. There are 6 primary indicators and 21 secondary indicators.

2.2 Weight Determination by Entropy Method

Normalize the data, calculate the information entropy of the processed data, calculate the utility value of each index, and finally calculate the weight of each index. Table 2-1 shows the average value, standard deviation, information entropy and other relevant data of the 21 evaluation indexes collected.

Table 2-1: Evaluation index and weight of pension industry in combination of medical care and pension

	Secondary indicators	Average Value	Standard Deviation	Information Entropy	Information Utility Value	Weight Coefficient
Population status A1	Dependency ratio of the elderly B1	0.419	0.348	0.8521	0.1479	4.6%
	Population size B2	0.694	0.36	0.9290	0.0710	2.2%
	Minimum living security B3	0.655	0.344	0.9257	0.0743	2.3%
Insurance services A2	Number of people with medical insurance B4	0.304	0.465	0.5928	0.4072	12.6%
	Number of endowment insurance B5	0.732	0.368	0.9235	0.0765	2.4%
Health security A3	Number of health institutions B6	0.424	0.494	0.7215	0.2785	8.6%
	Number of health workers B7	0.468	0.402	0.8413	0.1587	4.9%
	Number of sanitary beds B8	0.488	0.357	0.8795	0.1205	3.7%
Economy and consumption index A4	Average savings balance per capita B9	0.428	0.32	0.8821	0.1179	3.6%
	GDP of tertiary industry B10	0.493	0.331	0.8985	0.1015	3.1%
	Health care consumption index B11	0.383	0.348	0.8488	0.1512	4.7%
	Culture and entertainment consumption index B12	0.484	0.325	0.8999	0.1001	3.1%

	Secondary indicators	Average Value	Standard Deviation	Information Entropy	Information Utility Value	Weight Coefficient
	Life and service consumption index B13	0.258	0.35	0.7008	0.2992	9.2%
social welfare A5	Number of Parks B14	0.519	0.35	0.8951	0.1049	3.2%
	Number of reception and repatriation stations B15	0.589	0.393	0.8873	0.1127	3.5%
	Library run university for the aged B16	0.522	0.351	0.9015	0.0985	3.0%
	Green space area B17	0.589	0.392	0.8726	0.1274	3.9%
	Number of social welfare institutions B18	0.344	0.335	0.8055	0.1945	6.0%
	Number of cultural institutions B19	0.62	0.295	0.9405	0.0595	1.8%
Engel coefficientA6	Engel coefficient of urban residents B20	0.444	0.46	0.7810	0.2190	6.8%
	Engel coefficient of rural residents B21	0.362	0.384	0.7786	0.2214	6.8%

Then the weight of the first level fuzzy evaluation is: A=[0.091,0.15,0.172,0.237,0.214,0.136]. The entropy method is used to calculate the weight of the second level indexes in each first level index, and the first level fuzzy comprehensive evaluation is carried out for each factor. Then the second level fuzzy comprehensive evaluation is: B = [0.3095, 0.3032, 0.1832, 0.0945, 0.028]. According to the principle of maximum subordination, it is considered that people are very satisfied with the development of the industry system of the combination of medicine and nursing in Heilongjiang Province. V = {V1, V2, V3, V4, V5} = {very satisfied, satisfied, general, less satisfied, dissatisfied} = {100, 80, 60, 40, 20}, The quantitative comprehensive score is 78.65, which shows that there is still a considerable part of the rising space for the industrial system of the combination of medicine and nursing in Heilongjiang Province.

3. Optimization Strategy of Pension Industry in Combination of Medical Care and Pension in Heilongjiang Province

At present, the pension industry resources under the mode of combination of medical care and pension in Heilongjiang Province are relatively short, and there are some problems such as the relevant policies for the medical problems of the elderly are not perfect. According to the result analysis of the fuzzy comprehensive evaluation method, we further get the deficiencies of the pension in our province. According to the above conclusions, in order to further promote the further development of pension industry under the mode of combination of medical care and pension in our province, the following suggestions are put forward [6-8].

(1) Industrial Innovation. With the development of modern science and technology, some traditional pension industry has been unable to meet the needs of contemporary society “As a new concept proposed in recent years, "smart pension" uses modern technologies such as sensor technology and Internet technology to monitor the elderly. All industries should combine the concept of "smart pension" and go deep into the pension industry, so as to promote the transformation of the pension industry in Heilongjiang Province.

(2) Building a diversified system of combination of medical care and nursing care. China's aging population can be divided into three groups: young, middle-aged and old. Different health management systems should be established according to different groups of people, and a set of standardized system in line with the current pension industry standards should be formulated.

(3) Strengthen the training of medical staff. Heilongjiang government should pay more attention to the medical staff, strengthen the investment in hospitals and medical colleges, and improve the overall level of medical staff.

In recent years, the population loss of Heilongjiang Province is serious, and most of the young people go to other provinces, which leads to a sharp increase in the pressure of providing for the aged in Heilongjiang Province. The government should increase support, introduce foreign professionals, and establish a more professional and efficient pension industry.

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REFERENCES

1. Bao, S. (2018). The combination of medical care and pension in foreign countries and Its Enlightenment to China [J]. *Journal of Harbin Institute of Technology (SOCIAL SCIENCE EDITION)*, 20(2), 58-63.
2. Chen, K., & Li, S. (2018). Study on the feasibility, difficulties and Countermeasures of the mode of combining medical care with pension service [J]. *Guizhou social sciences*, *4*, 65-70.
3. Wang, L., Zhang, X., Wei, J., Feng, Y., & Wang, H. (2021). Study on the construction of nurse training system in integrated medical and nursing institutions [J]. *Laboratory medicine and clinical medicine*, *18*(08), 1174-1178.
4. Zhang, M., Lu, W., & Jia, Y. (2021). Study on the effect evaluation of the combination of medical and nursing care in Henan Province [J]. *Journal of Lanzhou Polytechnic*, *37*(02), 57-59.
5. Zhu, L., Yang, X., Zhang, Q., Wang, F., Zhang, X., & Xing, F. (2019). Study on the construction of service quality evaluation index system of community home care center with combination of medicine and nursing [J]. *China general practice*, *22*(02), 199-205.
6. Fu, C., & Han, J. (2018). Research on the development strategy of the elderly care service industry with the combination of medical care and nursing care [J]. *Economic review*, *1*, 28-35.
7. Deng, D., & Li, Y. (2018). The mode of combining medical care with nursing care: institutional rationality, supply and Demand Dilemma and mode innovation [J]. *Journal of Xinjiang Normal University (PHILOSOPHY AND SOCIAL SCIENCES EDITION)*, *39*(1), 107-114.
8. Mu, C. (2018). PPP mode and countermeasure analysis of social forces developing the combination of medical care and nursing care [J]. *Population in Northwest China*, *39*(2), 105-111.